FIG. 1

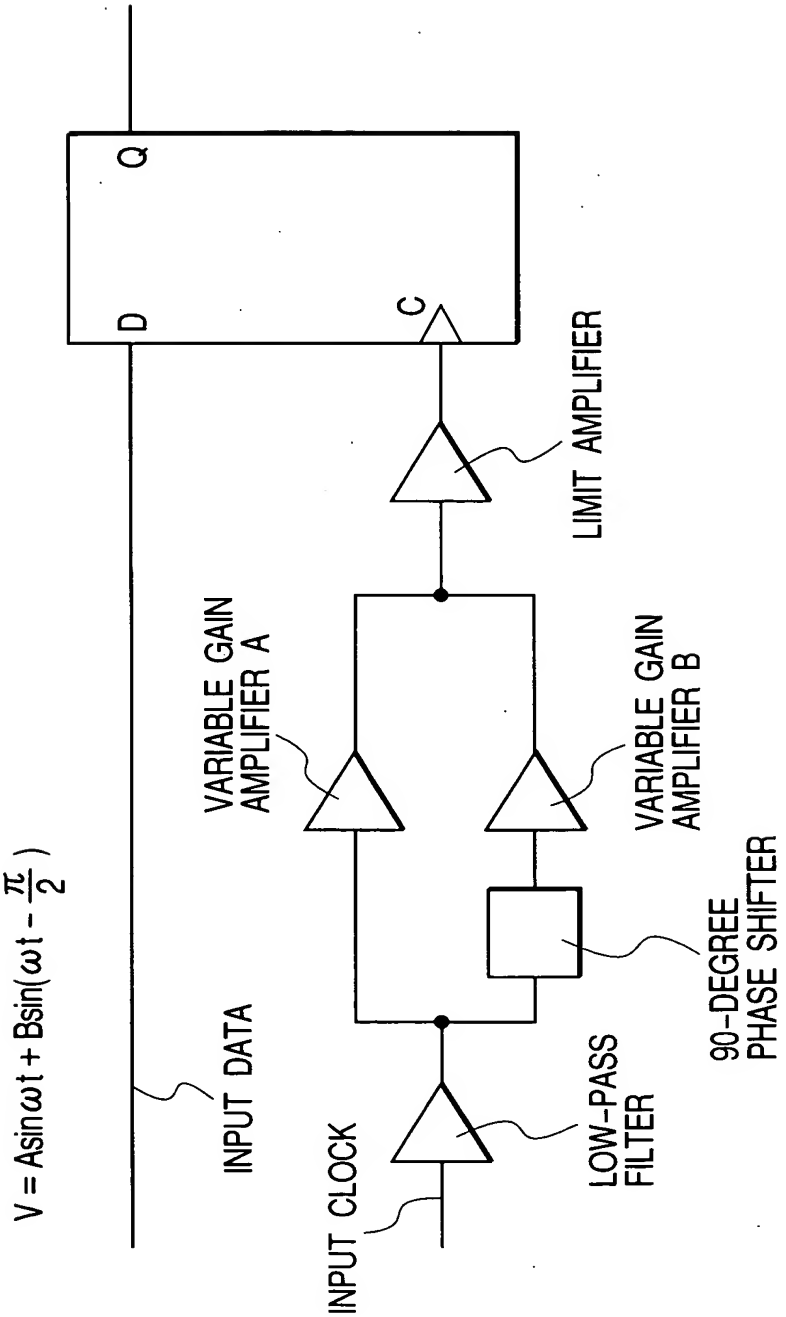

Q
D
C
LIMIT AMPLIFIER
VARIABLE GAIN AMPLIFIER A
VARIABLE GAIN AMPLIFIER B
90-DEGREE PHASE SHIFTER
LOW-PASS FILTER
INPUT CLOCK
INPUT DATA
V = Asinωt + Bsin(ωt - π/2)

FIG. 2

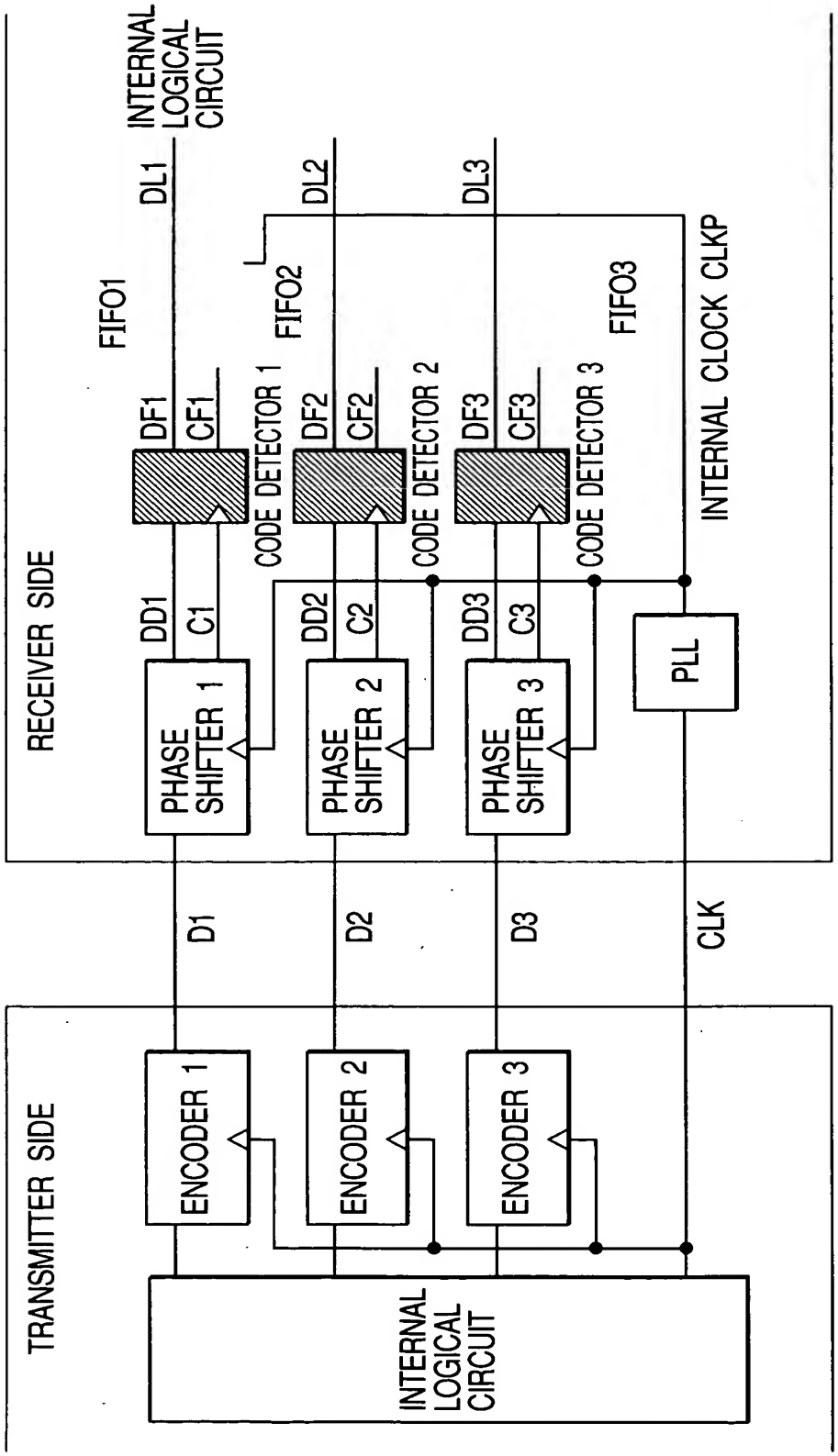

TRANSMITTER SIDE
RECEIVER SIDE
ENCODER 1
ENCODER 2
ENCODER 3
INTERNAL LOGICAL CIRCUIT
INTERNAL LOGICAL CIRCUIT
D1
D2
D3
CLK
PHASE SHIFTER 1
PHASE SHIFTER 2
PHASE SHIFTER 3
PLL
DD1
C1
DD2
C2
DD3
C3
CODE DETECTOR 1
CODE DETECTOR 2
CODE DETECTOR 3
DF1
CF1
DF2
CF2
DF3
CF3
FIFO1
FIFO2
FIFO3
DL1
DL2
DL3
INTERNAL CLOCK CLKP

FIG. 3

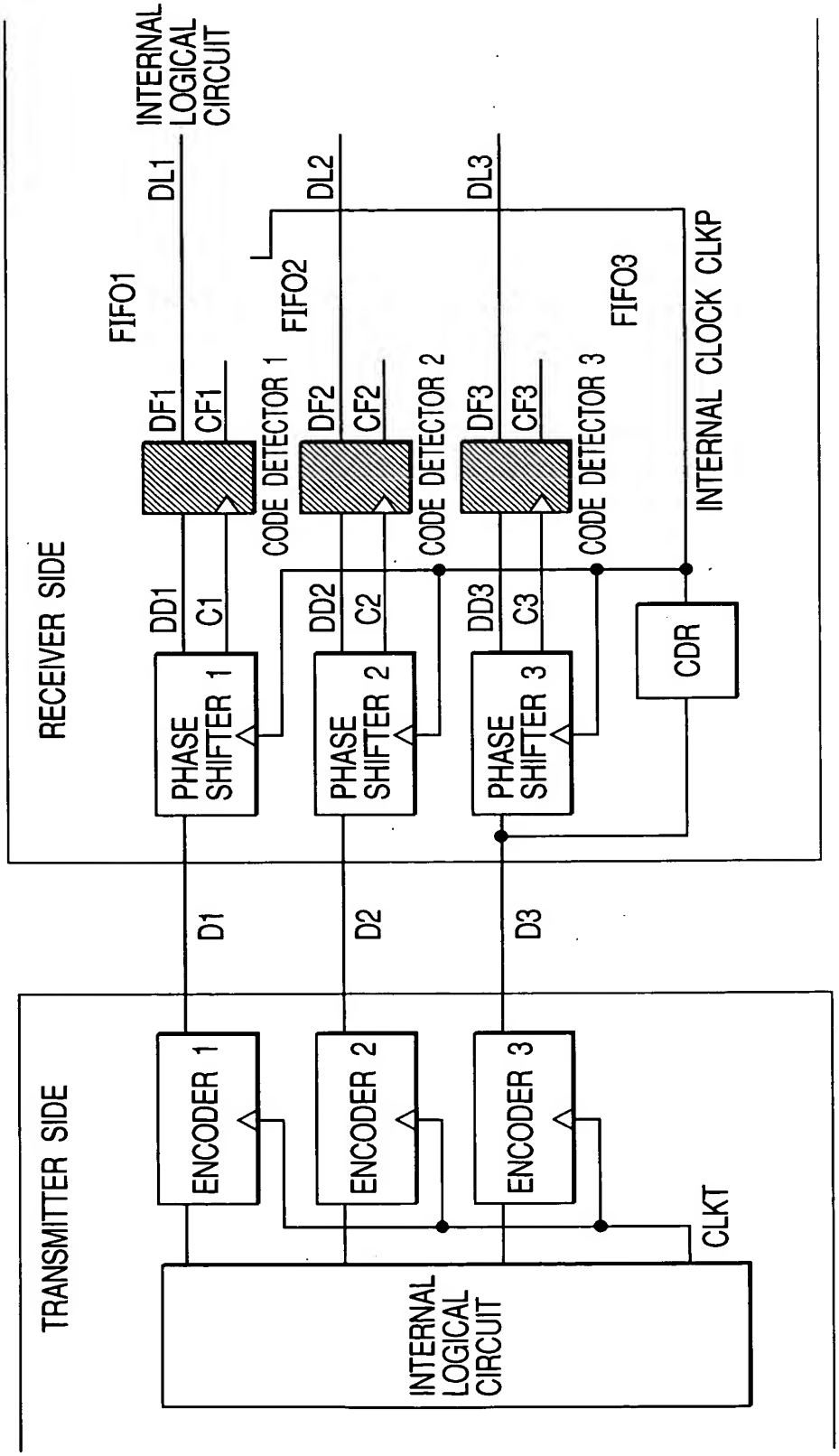

TRANSMITTER SIDE
RECEIVER SIDE
INTERNAL LOGICAL CIRCUIT
ENCODER 1
ENCODER 2
ENCODER 3
CLKT
D1
D2
D3
PHASE SHIFTER 1
PHASE SHIFTER 2
PHASE SHIFTER 3
CDR
DD1
C1
DD2
C2
DD3
C3
CODE DETECTOR 1
CODE DETECTOR 2
CODE DETECTOR 3
DF1
CF1
DF2
CF2
DF3
CF3
FIFO1
FIFO2
FIFO3
DL1
DL2
DL3
INTERNAL CLOCK CLKP
INTERNAL LOGICAL CIRCUIT

FIG. 4

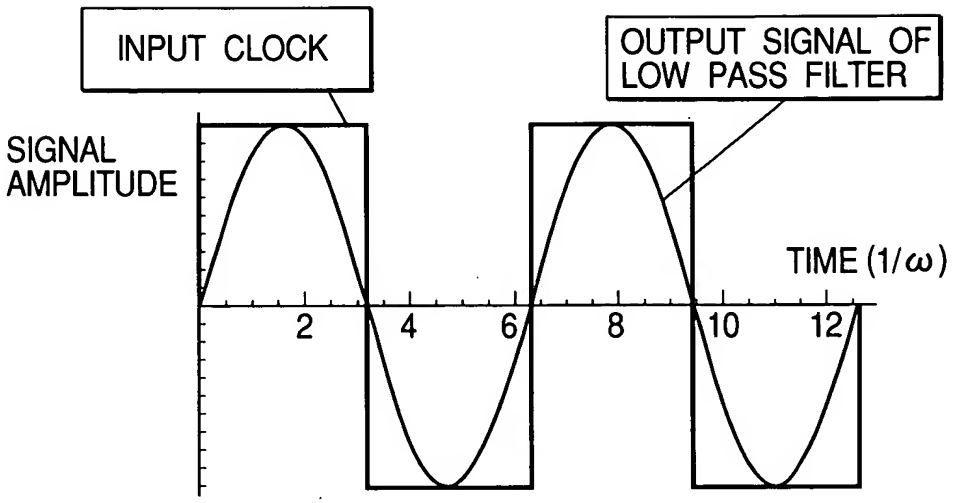

INPUT CLOCK
OUTPUT SIGNAL OF LOW PASS FILTER
SIGNAL AMPLITUDE
TIME (1/ω)
2
4
6
8
10
12

FIG. 5

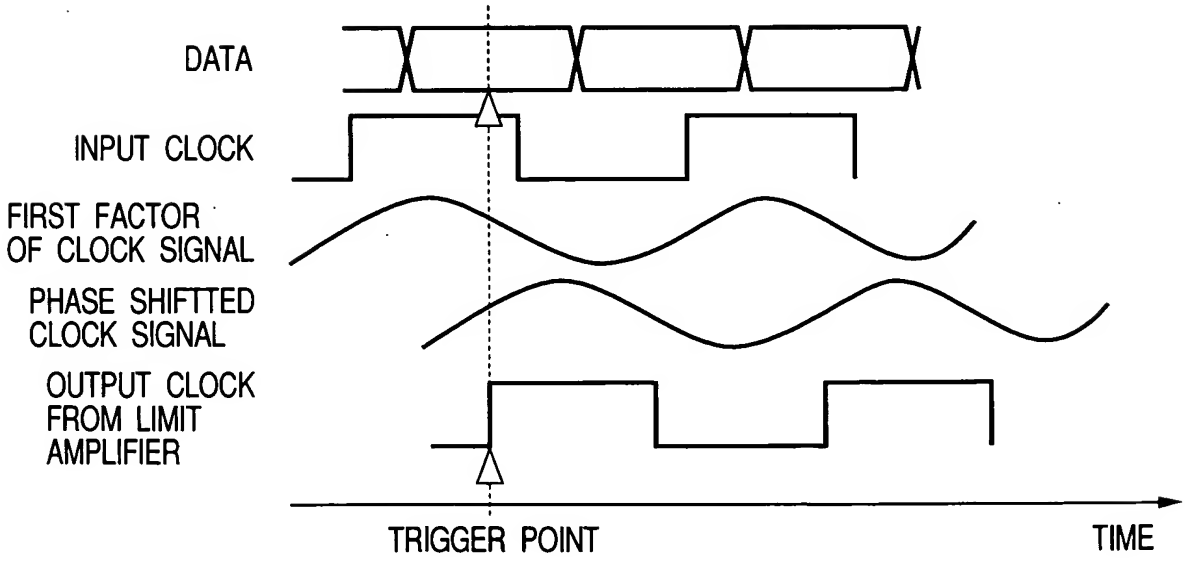

DATA
INPUT CLOCK
FIRST FACTOR OF CLOCK SIGNAL
PHASE SHIFTTED CLOCK SIGNAL
OUTPUT CLOCK FROM LIMIT AMPLIFIER
TRIGGER POINT
TIME

FIG. 6

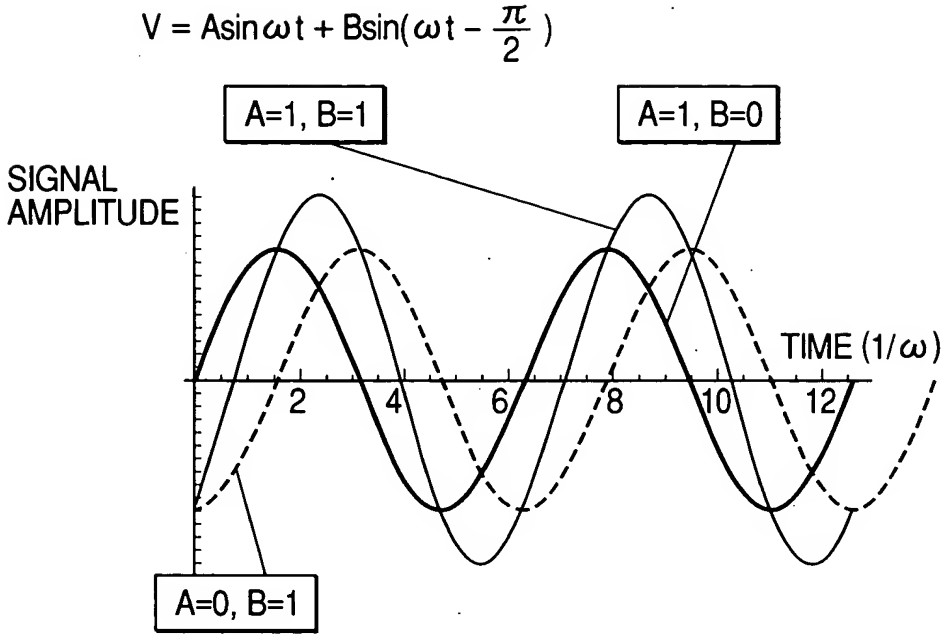

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$
A=1, B=1
A=1, B=0
SIGNAL AMPLITUDE
TIME (1/ω)
2
4
6
8
10
12
A=0, B=1

FIG. 7

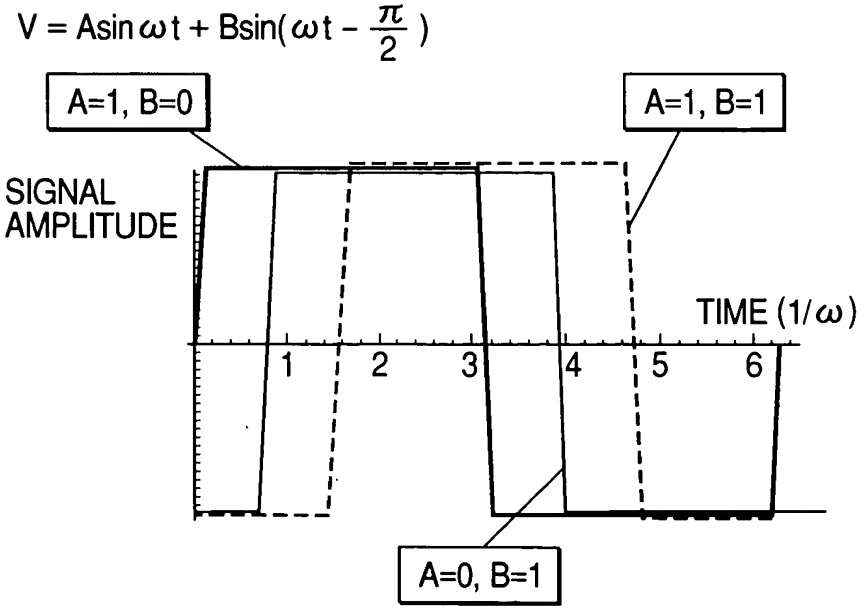

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$
A=1, B=0
A=1, B=1
SIGNAL AMPLITUDE
TIME (1/ω)
1
2
3
4
5
6
A=0, B=1

FIG. 8

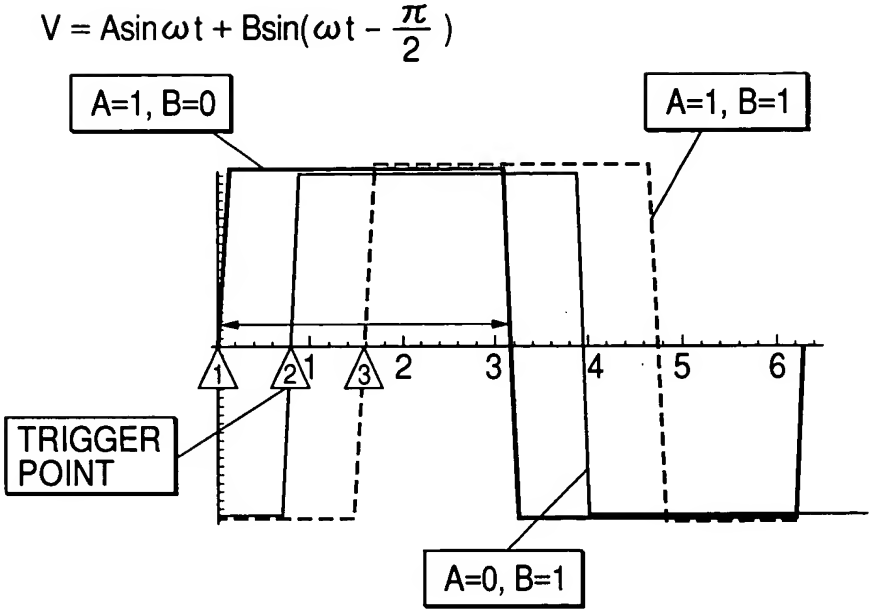

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$
A=1, B=0
A=1, B=1
1
2
1
3
2
3
4
5
6
TRIGGER POINT
A=0, B=1

FIG. 9

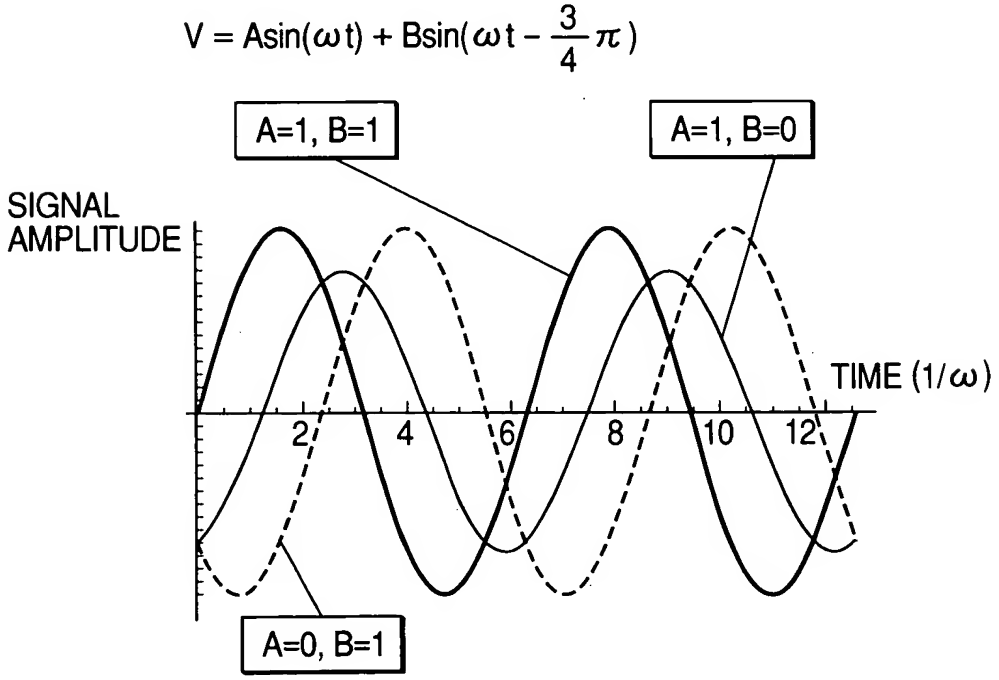

$V = A\sin(\omega t) + B\sin(\omega t - \frac{3}{4}\pi)$
A=1, B=1
A=1, B=0
SIGNAL AMPLITUDE
TIME (1/ω)
2
4
6
8
10
12
A=0, B=1

FIG. 10

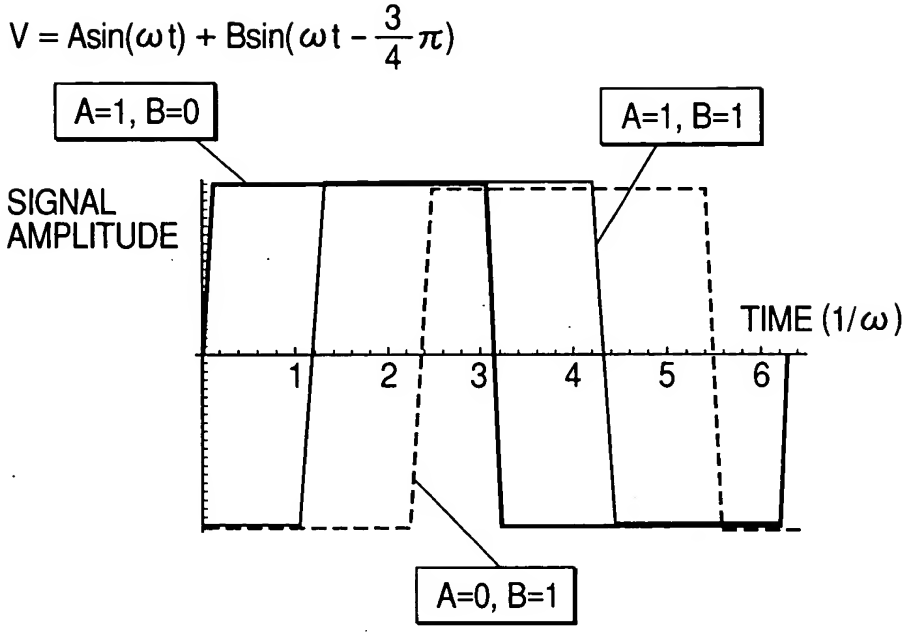

$V = A\sin(\omega t) + B\sin(\omega t - \frac{3}{4}\pi)$
A=1, B=0
A=1, B=1
SIGNAL AMPLITUDE
TIME (1/ω)
1
2
3
4
5
6
A=0, B=1

FIG. 11

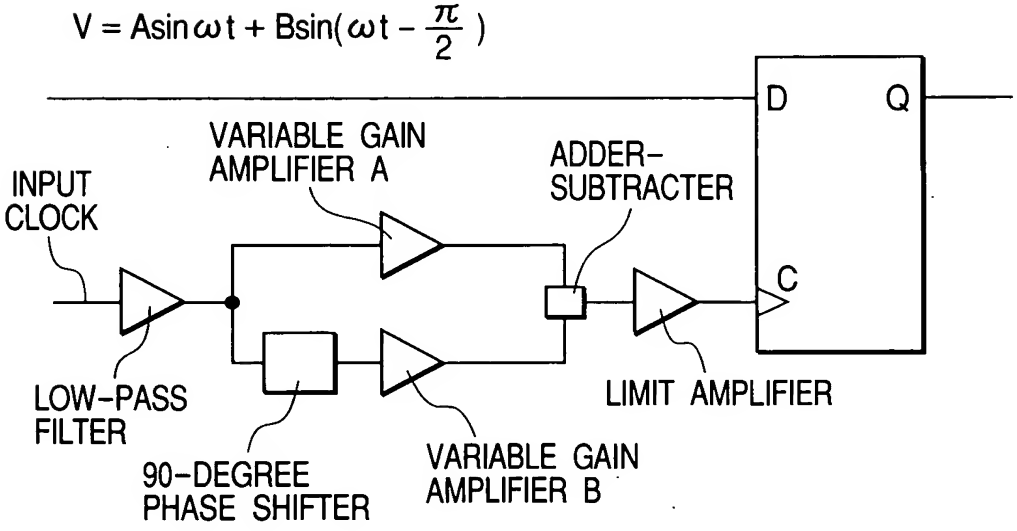

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$
D
Q
C
VARIABLE GAIN AMPLIFIER A
ADDER-SUBTRACTER
INPUT CLOCK
LOW-PASS FILTER
90-DEGREE PHASE SHIFTER
VARIABLE GAIN AMPLIFIER B
LIMIT AMPLIFIER

FIG. 12

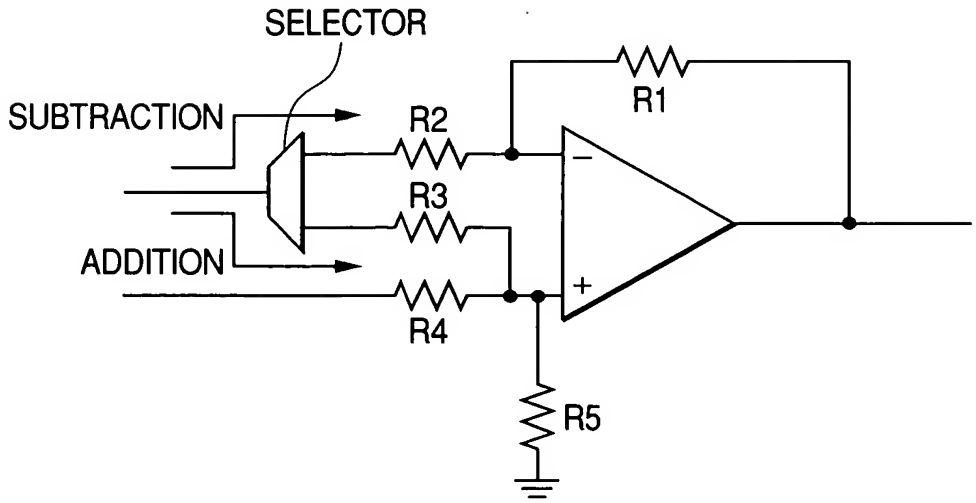


FIG. 13

$$V = A\sin\omega t + B\sin\left(\omega t - \frac{\pi}{2}\right)$$

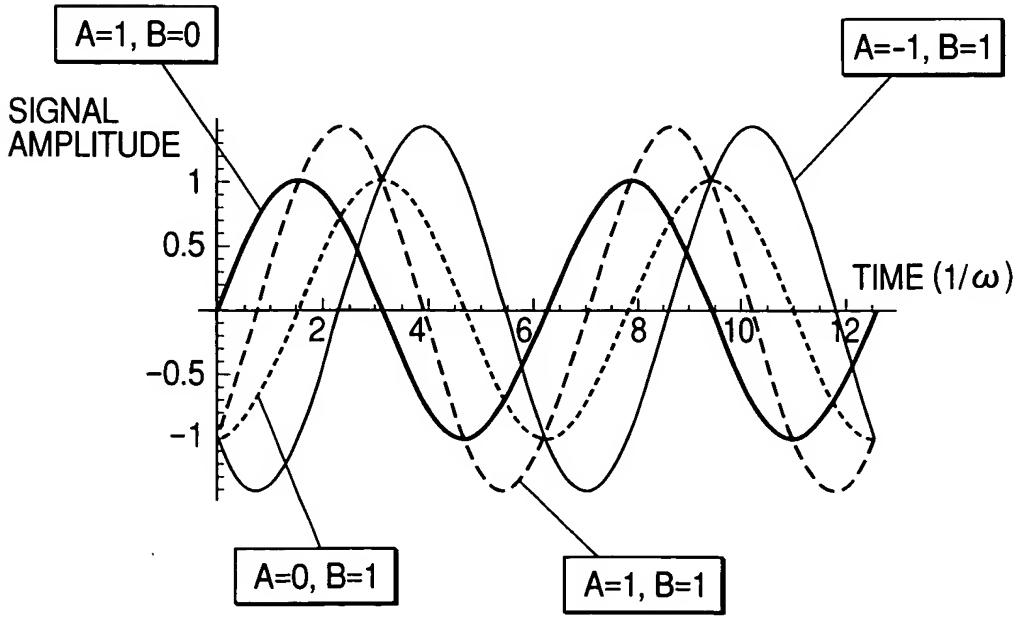


FIG. 14

$$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$$

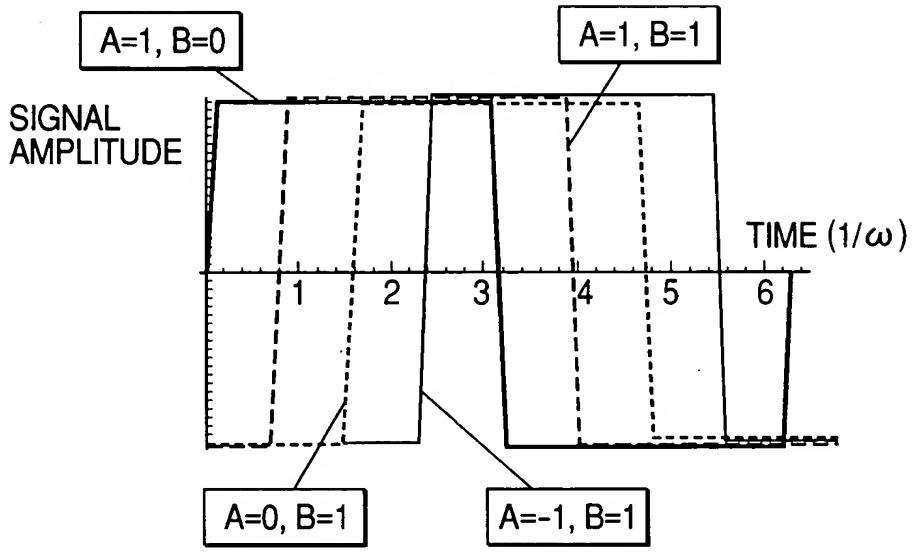


FIG. 15

$$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$$

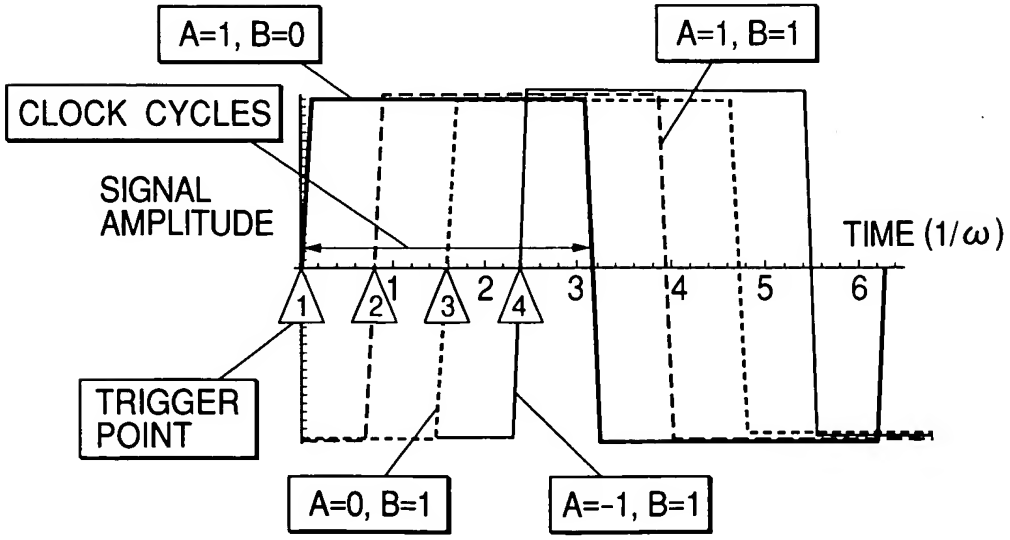


FIG. 16

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$

(1) A=1, B=0
(2) A=1, B=0.5
(3) A=1, B=1
(4) A=0.5, B=1
(5) A=0, B=1
(6) A=−0.5, B=1
(7) A=−1, B=1
(8) A=−1, B=0.5

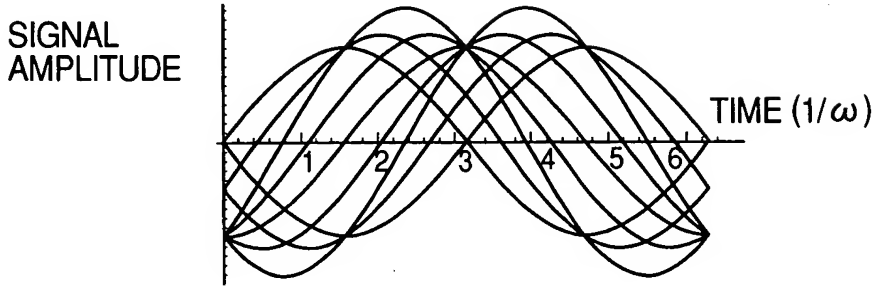


FIG. 17

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2})$

(1) A=1, B=0
(2) A=1, B=0.5
(3) A=1, B=1
(4) A=0.5, B=1
(5) A=0, B=1
(6) A=−0.5, B=1
(7) A=−1, B=1
(8) A=−1, B=0.5

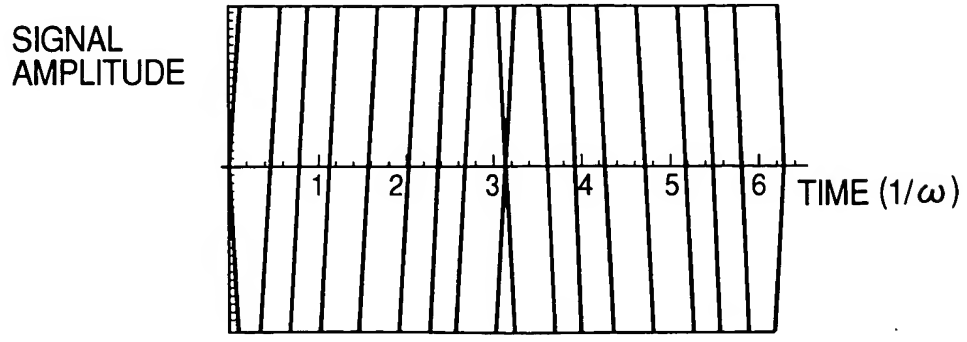


FIG. 18

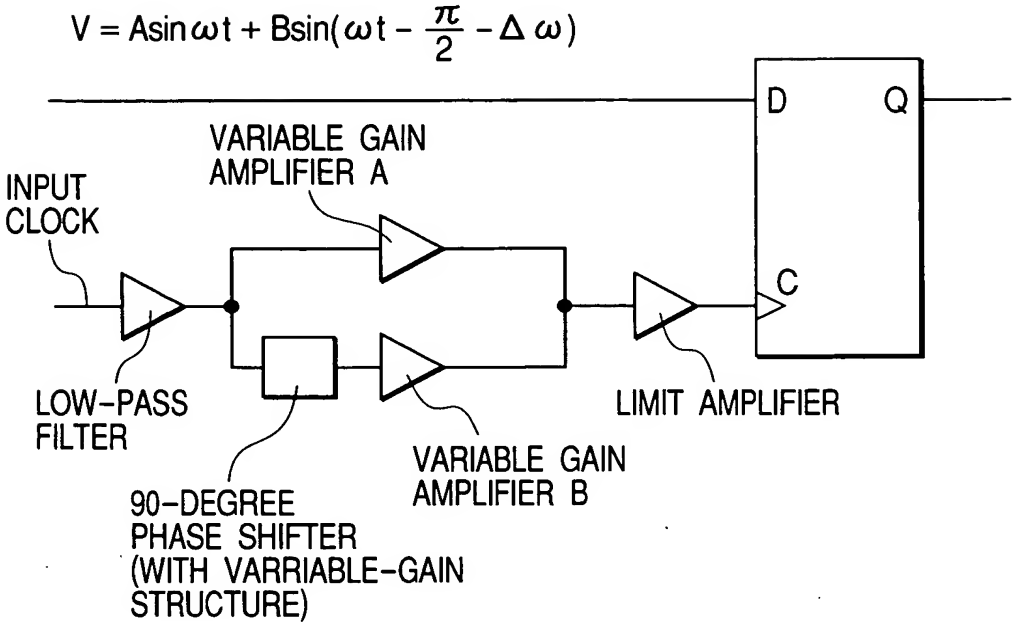
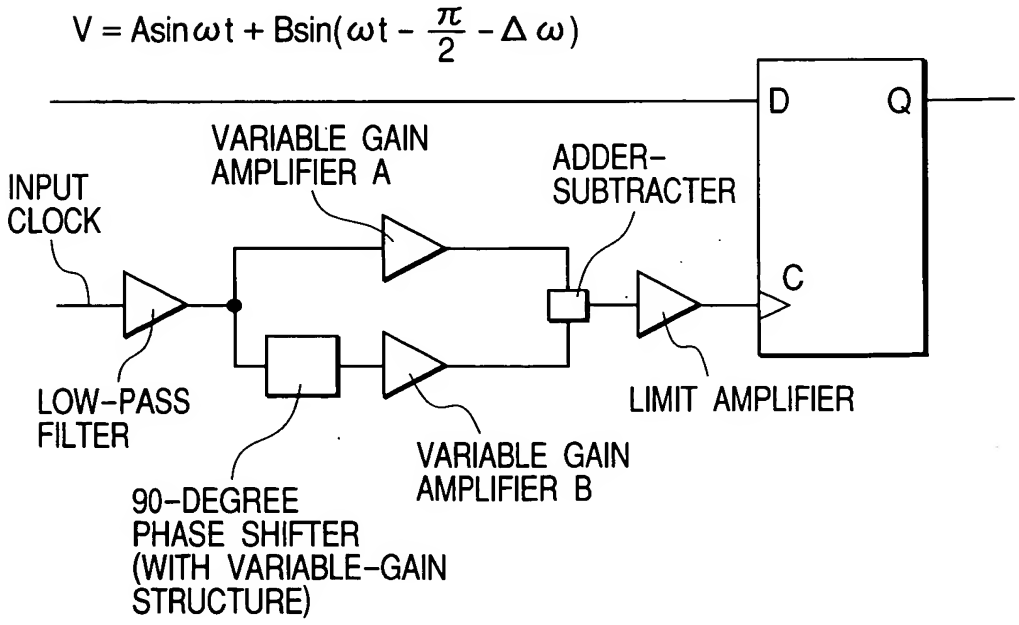

$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2} - \Delta\omega)$
D
Q
C
VARIABLE GAIN AMPLIFIER A
INPUT CLOCK
LOW-PASS FILTER
90-DEGREE PHASE SHIFTER (WITH VARRIABLE-GAIN STRUCTURE)
VARIABLE GAIN AMPLIFIER B
LIMIT AMPLIFIER

FIG. 19


$V = A\sin\omega t + B\sin(\omega t - \frac{\pi}{2} - \Delta\omega)$
D
Q
C
VARIABLE GAIN AMPLIFIER A
ADDER-SUBTRACTER
INPUT CLOCK
LOW-PASS FILTER
90-DEGREE PHASE SHIFTER (WITH VARIABLE-GAIN STRUCTURE)
VARIABLE GAIN AMPLIFIER B
LIMIT AMPLIFIER